UNIVERSITY OF TUZLA UNIVERZITET U TUZLI

SYLLABUS

1. Course title:

Mathematics I

2. Code:

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

Mandatory

6. Prerequisites:

none

7. Class restrictions:

none

8. Duration / semester(s):

I | **I**

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
9.1. Lectures	3		Classes:	56,25
9.2. Seminars	2		Individual work:	104,42
9.3. Laboratory / Practice classes	0		In total:	160,67

10. Faculty:

Mechanical Engineering

11. Department/study program:

Production Engineering, Energy and thermo-fluid engineering and Mechatronics

12. Lecturer:

Dr. sc. Samra Moranjkić, Associated Professor

13. Course aims:

The main goal of the course is for students to acquire the basics of higher mathematics in order to be better prepared for studying other disciplines within subjects that directly or indirectly rely on mathematics.
The goal is to develop the student's sense of logical and visual understanding of phenomena, problems and figures in the

Euclidean space, and to familiarize them with possibilities of applying the content they listen to.

14. Learning outcomes:

After completing the course, students are expected to be able to:
- perform operations in the set of real and complex numbers,
- apply the theory of matrices and determinants for solving the systems of linear algebraic equations,
- independently apply some parts of the material to the technical problems, e.g. in the area of vector algebra or analytic geometry,
- calculate the derivative of functions regardless of the given form of the function,
- know how to examine the behavior of a function, draw a graph of the function and expand the functions into the series,
- easily acquire knowledge from other subjects, primarily Mathematics II and III.

15. Course content:

1. Introductory lecture. The set of real numbers with their subsets.
2. Absolute value of real number. The principle of mathematical induction. Binomial formula.
3. Complex numbers. Operations in the set C.
4. Elements of linear algebra: algebra of matrices and determinants.
5. Inverse matrix. Matrix rank.
6. Systems of linear algebraic equations, general theory and methods for solving rectangular nonhomogeneous systems (Kronecker-Capelli theorem, Gauss method).
7. Methods for solving quadratic systems (method of matrix equations, Cramer's method). Homogeneous systems.
8. First test (T1).
9. Elements of vector algebra, vectors, scalars and operations. Vector space.
10. Analytic geometry in Euclidean space. Lines and plains.
11. Numerical sequences. Limits of sequences. Number e.
12. Real functions of one variable. Limit of the functions. Continuity of function.
13. Differential calculus of a real function of a real variable. Differentiation rules. The geometric interpretations of the derivative. Higher order derivatives and differentials.
14. Fundamental theorems of differential calculus. L'Hospital theorem. Application.
15. Second test (T2).

16. Learning methods:

- Frontal form with direct and interactive method.
- Lectures with and without the use of multimedia tools with active participation and discussions of students.
- Practical exercises
- Consultations with assistants and professor.

17. Assessment methods:

Grading scale is as follows:

Grade	Description	Letter/Points
5 (five)	Does not meet minimum criteria	F <54
6 (six)	Meets minimum criteria	E 54-64
7 (seven)	Generally good, but with significant shortcomings	D 65-74
8 (eight)	Average, with noticeable errors	C 75-84
9 (nine)	Above average, with some errors	B 85-94
10 (ten)	Exceptional with no or minor errors	A 95-100

18. Assessment components:

During the semester, the student takes two tests:
Test I (25)
Test II (25).
The tests are done in written form and contain 5 problems each. Tests are considered passed if they have in the sum a total score of 25 points, of which the minimum score per test is 10 points.

The final exam is in a written form or combined with an oral form and consists of theoretical questions and accompanying examples. A student can score a maximum of 50 points on the final exam. The final exam is considered passed if the student scores a minimum of 24 points, with a total score of 54 points in order to receive a passing grade.

A student who, after the tests and the final exam, did not score a minimum of 54 points will take a repeat exam. On the repeat exam, the student corrects the part on which he didn't pass or scored the least points (test I or test II or the final part of the exam).

19. Mandatory reading list:

1. S. Drpljanin, Matematika, Tuzla, 1997.
2. S. Karasuljić, S. Halilović, Matematika I, Tuzla 2021.

20. Additional reading list:

1. D. Jukić, R. Scitovski, Matematika I, Osijek, 1998.
2. P. M. Miličić, M. P. Uščumlić, Zbirka zadataka iz matematike I i II, Beograd, 2002.

21. Web sources:

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: